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**DIGITAL TRANSFORMATION OF THE LABOR MARKET AND ITS INFRASTRUCTURE**

**Introduction**

Modern civilization has plunged into a digital world that is in constant motion. The era of countless digital transformations and innovations has arrived. Digital transformation creates the basis for significant transformations not only in the way of production and business. It also changes the type of work, creates new opportunities on the labor market and requires modernization of its infrastructure.

Meanwhile, digital expectations and opportunities are perceived by some citizens as a barrier that can lead to individuals being excluded or perhaps having to fight further for the social services to which they are entitled. All this emphasizes the relevance of studying the problem of transformation of the labor market and its infrastructure in their theoretical and practical significance.

**Purpose, subject and method of research**

The purpose of the study is to investigate the trends of digital transformation of the labor market and its infrastructure, to reveal the directions of development of the digital transformation of the modern labor market and its infrastructure, to analyze new opportunities and threats associated with the digital transformation of the labor market.

The subject of the study is a set of tools for analysis and forecasting of dynamic processes of functioning and development of the digital labor market and its infrastructure.

The research methods are general scientific research methods, the system approach method, and comparative methods.

**Findings**

There is no single definition of the term "digital transformation". The study of the interpretation of the concept of "digital transformation" by scientists is multifaceted in content. There is an opinion that "digital transformation" is a fundamental change in the way of thinking about customer experience, business

models and operations. It is about finding new ways to achieve value, generate profit and increase efficiency [1].

Many scientists focus on digital transformation as a key component of the overall business restructuring strategy. At the same time, today's technology – combined with people, processes and operations – enables businesses to adapt quickly to disruptions and opportunities; meet new and growing customer needs; and drive future growth and innovation, often in unexpected ways [2].

Firms, enterprises, companies in various sectors of the economy are investing significant funds to multiply their digital capabilities. Because of this, the transition from traditional business to digital will significantly accelerate the growth of the global digital transformation market.

It would not be an exaggeration to say that global investments in digital transformation will continue to multiply. It was found that the global digital transformation market size was estimated to be USD 594.5 billion in 2022. Most likely, according to scientists, it will reach 1,548.9 billion US dollars by 2027, showing a compound annual growth rate (CAGR) of 21.1% during the forecast period [3]. It can be expected that among all countries, the largest expenditures in the space of digital transformation will be made by such states as the USA, Europe and China.

For enterprises in today's world, the only constant is change, and the only definite direction is digital transformation and modernization. Learning to overcome challenges in the process of change is the main goal for business growth. The main result of digital transformation is the business receiving the largest possible dividends from the introduction of technologies and innovations.

An analysis of the experience of highly developed countries suggests that the realization of the potential of modern industrial enterprises in the near future, proposed by the Fourth Industrial Revolution, will depend on their ability to effectively follow three main principles: focusing on long-term sustainability as a key factor in productivity, growth, sustainable development and inclusiveness; large-scale implementation of technologies to expand the capabilities of the workforce; participation in ecosystem cooperation that opens up new ways of obtaining and providing value to a wider group of stakeholders [4].

Digital transformation has a significant impact on the functioning of the labor market and its infrastructure. The proliferation of labor relations on digital platforms encourages the emergence of a digital labor market.

The digital labor market is a specific segment of the global labor market in which demand and supply are formed in a digital way and conditions are created for the participation of the economically active population in the global digital division of labor through involvement in global digital production. The product of the digital labor market is the result of labor activity created with the help of digital technologies [5, p. 28-33].

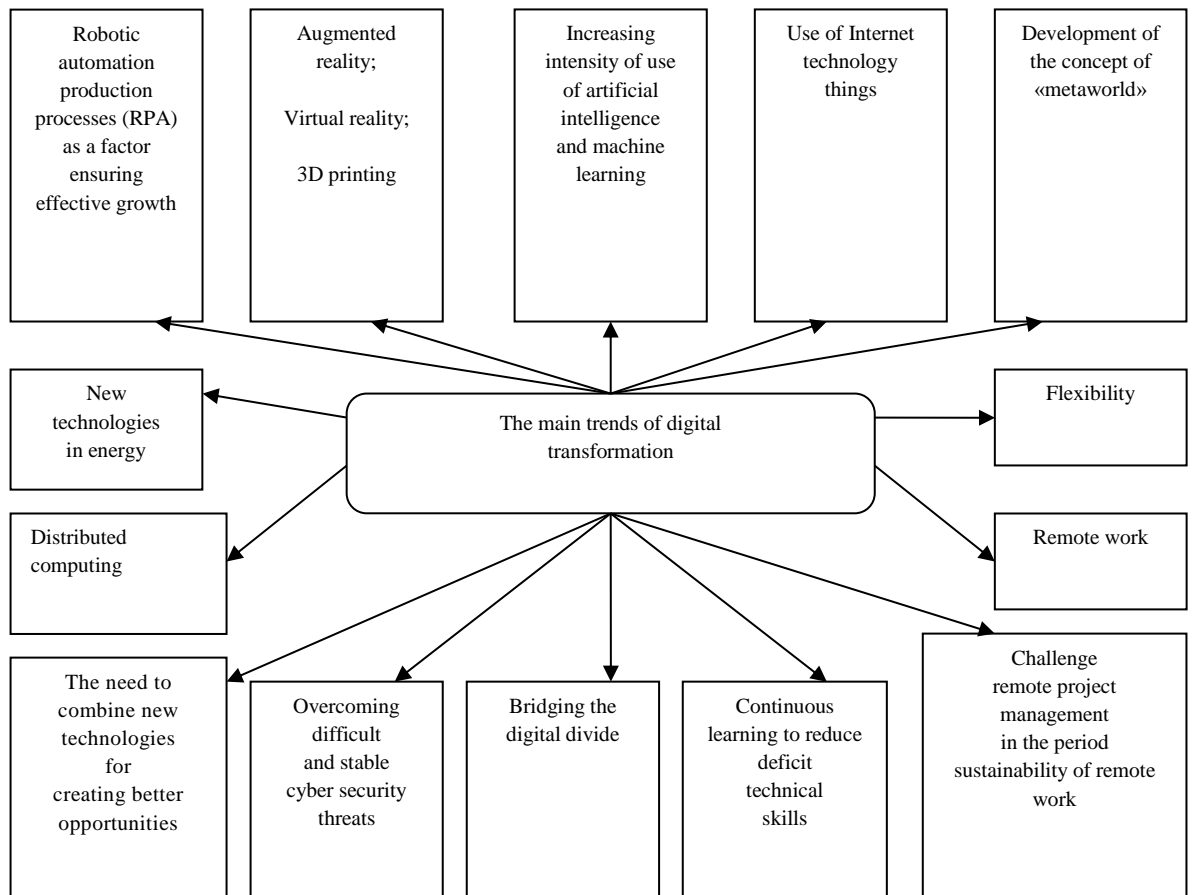
The basis for the digital transformation of the labor market should be considered the symbiosis of the digital infrastructure and the infrastructure of the labor market. Digital infrastructure is a set of technologies, products and processes that provide computing, telecommunications and network capabilities for electronic interaction, data exchange, signals, etc. Digital infrastructures are the foundation of the digital economy. They are divided into support (hard) and service (soft) [6].

A strong case can be made that employment is the basis of people's livelihoods, and that «employment stability» and «employment protection» are the top priorities of modern economic development. Therefore, in the process of accelerated integration of digital technologies and the real economy, the importance of modern technology companies that use digital platforms for employment as the basis of their business model will become more and more relevant.

Research shows that (fig. 1) knowledge and analysis of the main trends of the digital transformation of the labor market will contribute to the creation of new values, the expansion of employee opportunities and the increase of business competitiveness, as well as stimulate effective, sustainable growth in the future.

The digitization of the labor market has been greatly accelerated by two years of the COVID-19 pandemic, which has forced remote work, investment in IT infrastructure and new, more flexible employment models. Much of the hiring process has also moved online. As a result, there has been a long-term transition to an unprecedented level of remote and flexible working. In addition, many firms and businesses are increasingly rethinking the need for expensive corporate headquarters and offices. Despite this, the legalization of remote work took place in Ukraine, that is, its regulatory and legal support was formed, and the infrastructure of the digital labor market received an impetus. Many businesses and firms have begun to modernize their production facilities for hybrid operation and accelerated the improvement of production processes with flexibility in mind.

In today's conditions, it is not easy to predict the scale of digital transformation, the speed and content of changes that will take place in the future, as well as their impact on the labor market and its infrastructure, work and people's lives.



**Figure 1. The main trends of the digital transformation of the labor market [7, 8, 9]**

With the beginning of Russia's full-scale armed aggression, the uncertainty in the labor market of Ukraine rapidly intensified. According to estimates by the International Organization for Migration (IOM), as of November 8, 2022, population migration abroad reached 7.8 million Ukrainian refugees. According to the Office of the United Nations High Commissioner for Refugees (UNHCR), as of September 2022, 2.9 million people and 9,400 Ukrainian children were relocated to the Russian Federation. According to the Russian mass media, more than 3.4 million Ukrainians entered the Russian Federation from Ukraine, including 448,000 children. According to D. Gerasimchuk, Advisor to the President of Ukraine on Child Rights and Child Rehabilitation, as of June 2022, 234,000 Ukrainian children were taken from Ukraine to the territory of the Russian Federation, certain districts of the Donetsk and Luhansk Oblasts

(ORDLO) and Belarus. According to the forecast of competent specialists of the Council of the EU, as a result of migration, the population in the regions of Ukraine may decrease by 24-33% [10].

The modern labor market in the conditions of the Russian-Ukrainian war is faced with such problems as the reduction of the working population, the increase in the qualification and professional gap of employees, the decrease in labor productivity, the growth of the disparity between the countryside and the city, the drop in real wages, the increase in the level of informal employment, the deepening of the discrepancy between labor supply and demand in regional labor markets.

The main reasons for the reduction of the working-age population in the regions of Ukraine include: demographic factors (aging population, prolonged forced emigration, conscription for military service during mobilization, deaths and injuries of the civilian population in various regions of the country as a result of the large-scale armed aggression of the Russian Federation against Ukraine and military actions, illegal deportation of Ukrainian citizens to the Russian Federation, etc.).

Today's global labor market is comprehensively affected by the digital transformation, which will continue in the future. In confirmation of this, it is worth mentioning a survey of the opinion of 1,703 business leaders of information technologies conducted by the Red Hat company, which indicates that "investing in the digital transformation of business and technological skills are the main priorities for 37% of respondents; training of people and skills (30%) is identified as the next direction of investment [11].

The formation of the digital economy and military actions in Ukraine have significantly changed the national labor market and its infrastructure. The significant spread of the latest technologies in society has led to the emergence of «digital work», non-standard forms of employment, changed the requirements for all players of the labor market; modified the practice of hiring employees; increased mobility and flexibility; deepened the requirements for education. One of the critical problems was the lack of qualified personnel. After all, the demand for labor force changes faster than the qualification profiles and competences of the labor force adapt.

According to Wojciech Ratajczyk, CEO of Trenkwalder Polska, a leading provider of personnel services in Central and Eastern Europe, «ongoing digital transformation will be one of the dominant trends in the labor market in 2023.» V. Ratajczyk singled out two main directions of digitalization of the modern labor market, which are closely related to each other. First of all, it is communication, because the vast majority of interviews with candidates for positions are conducted through communication programs, – notes the president of the board of «Trenkwalder Polska». The emergence of crowdstaffing, which is beginning to be used more and more intensively, is recognized as the second direction. This

innovative technology is a kind of «outsourcing of tasks» related to the search and recruitment of personnel through open virtual platforms. Crowdstaffing is becoming increasingly known as community recruiting. The essence of crowdstaffing is that recruiting companies build IT platforms on which they offer their highly qualified personnel for sale [12].

Therefore, the use of crowdstaffing will contribute to the creation of new jobs, in particular for freelancers who will not be formally connected to any company, but will be able to earn their decent income. At the same time, crowd technologies are turning into a source of development of business structures and realization of people's abilities through the Internet.

It is also necessary to recognize the impact on the labor market not only of the digital transformation, but also of the energy transformation, which has been «vividly» intensified in recent months by the energy crisis, forcing enterprises and firms to save energy and reduce harmful emissions. As a result, there will be a growing demand on the labor market for specialists dealing with energy efficiency and/or minimizing the impact of the activities of firms, enterprises, and companies on the environment.

Digital transformation is changing workforce needs in many areas, including skills, occupations and technology. Because of these changing needs, many occupations and skills are at risk of becoming irrelevant or obsolete, while other fields emerge. At the same time, the service sector is growing rapidly, which operates with longer or shorter working hours than the current legislation, under conditions of flexible working hours. There is a growing need for greater mobility of labor resources, which leads to the strengthening of the role of fixed-term employment contracts.

Intelligent digital technologies such as robotics, artificial intelligence, machine learning, Internet of Things, advanced analytics, augmented reality, virtual reality; 3D printing has the potential to change the way people work and do business, and the way businesses interact with customers and the world.

The result of the introduction of new technologies in the labor market is the spread of non-standard forms of employment: temporary, part-time and informal, self-employment. At the same time, the negative consequences of digital employment can be: the existence of imbalances between the national labor market and the field of education, non-payment by the customer for the work performed, underinvestment in human capital, the presence of digital exploitation, lack of social protection, low level of labor protection, inappropriate regulation of the digital market segment labor.

Recently, there has been a positive change in attitudes around the world and in Ukraine regarding the expansion of the use of artificial intelligence (AI). An IBM study showed that 42% of companies are considering the possibility of using AI, and 35% are already using it [7].

Undoubtedly, artificial intelligence has replaced many routine operations in production. Thanks to AI, not only new interesting professions can appear, but also entire industries. In the current conditions, AI is already used in various sectors of the economy. In particular, some employers use artificial intelligence to monitor the functioning of workers with the help of an application installed on the employee's smartphone.

Areas of activity such as customer service, provision of programming services, and advertising services that require communication with customers and solving their problems can benefit from the introduction of artificial intelligence in the labor market. On the other hand, a forecast by Forbes magazine in the United States of America shows that artificial intelligence may take the jobs of nearly 1 billion people worldwide in the next ten years. As a result, this could lead to the loss of nearly 375 million jobs.

It is worth emphasizing that the Cabinet of Ministers of Ukraine approved the Action Plan for the implementation of the Artificial Intelligence Development Concept for 2021-2024. One of the tasks of this Plan is to ensure the use of AI technologies in defense systems, the sphere of health care, justice, as well as for the analysis of the effectiveness of the public administration system.

It is worth mentioning that artificial intelligence is used by the State Employment Center for more effective employment of Ukrainians. The development and implementation of a new program called «National Personnel Reserve» is designed with the help of artificial intelligence to help Ukrainians determine: their own abilities for 1000+ professions; the level of mastery of the most in-demand skills in the labor market; inclination to entrepreneurship. Therefore, the use of artificial intelligence as an effective tool of the infrastructure of the digital labor market of Ukraine since the beginning of the Russian-Ukrainian war is one of the measures to overcome the recession of the economy and the increase in unemployment.

In our opinion, the following are the important areas of use of artificial intelligence by the State Employment Center: the creation of an internal talent market; ensuring internal talent mobility; improving skills. At the same time, it is worth emphasizing the development of high-quality legislation that would guarantee the possibility of using artificial intelligence and other new technologies for the benefit of humanity.

It is also necessary to use robotic systems and digital technologies, such as virtual reality (VR) and augmented reality (AR), which are socially important for the digital transformation of the labor market. The aforementioned technologies are able to provide a more practical aspect of vocational education and vocational pre-university education, strengthening the connection between school and learning or the workplace. Hence, there is a need to invest in new technologies such as VR, AR, simulation, 3D and skills development for coaches. Unfortunately, the current financial situation of domestic education and Ukrainian



manufacturers is such that they are unable to purchase these technologies on their own, so a high-quality digital transformation of the labor market and its infrastructure is possible only thanks to the formation of effective institutions for interaction with the world market.

The digital transformation of the labor market stimulates initiatives to improve the skills and training of employees. Unfortunately, a small number of people have experience with certain digital skills. When solving the problem of professional development, in our opinion, it is possible to use the best global experience for acquiring skills, in particular, the «70-20-10» approach, according to which:

10% = education (on the first place);

70% = learning by doing/implementation (i.e. practice-oriented);

20% = on-the-job coaching (e.g., daily conversations, feedback) [14].

Certainly, this type of skill acquisition is more effective than sending employees for training and passively expecting them to return with improved skills.

A significant modern problem of the successful digital transformation of the labor market is the inconsistency of the domestic infrastructural provision with the new socio-economic and international legal realities. The role of the new infrastructure of the digital labor market in close cooperation with critical infrastructure is to increase the level of digital literacy of Ukrainians, ensure the growth of general Internet accessibility, shape digital thinking, determine directions of digital transformation, shape a digital society. One of the four strategic tasks for the Ministry of Digital Transformation of Ukraine is to teach 6 million Ukrainians digital literacy in three years [15].

Unfortunately, a digital society has not yet been formed in Ukraine, in which the population would be able to take a critical and constructive attitude towards digital technologies. It is assumed that the main directions of the digital impulse in the regions of Ukraine will include: continuous education, which will be focused on qualified workers and specific sectors/industries.

An adequate response to the digital and energy transformation of the modern labor market and its infrastructure will be the disappearance of certain professions from the market. Yes, occupations that require well-defined, repetitive skills in narrow areas, such as data analysis, simple manual work, will disappear. Both of these professions can be replaced by jobs in the long run.

## **Conclusions**

In our opinion, the exact time of the inevitable victory of Ukraine against the Russian aggressor will be determined not only by the speed with which the USA, Great Britain, Poland, Germany, France, and other partners will be able to deliver packages of military assault weapons (tanks, planes, long-range missiles), to change the rules of the game. The victory of our state will certainly depend on

the speed of carrying out various reforms, including the promotion of digital transformation, and on the art of effectively mastering significant international financial assistance to overcome the devastating consequences of the war and restore the economy in the regions of Ukraine, as well as on the dexterity to take advantage of the unprecedented «a window of opportunity», providing all the conditions for the creation of a «Ukrainian economic miracle».

The digital transformation of the labor market and its infrastructure should be used for the benefit of citizens, businesses and Ukraine's victory over the Russian aggressor. The challenge for the labor market infrastructure is to create the right conditions so that everyone can use and benefit from digital technologies.

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#### **Abstract**

The article examines the essence of digital transformation and substantiates the growth rates of the global digital transformation market. The principles of successful realization of the potential of modern industrial enterprises in the near future are revealed. The impact of digital transformation on the labor market is characterized. The key trends of the digital transformation of the labor market for effective growth are highlighted. The main problems of the labor market in the conditions of the Russian-Ukrainian war are highlighted. The directions of digital transformation of the modern labor market are revealed. New opportunities and threats related to the digital transformation of the labor market are analyzed. Prospects for the further development of the digital transformation of the labor market and the development of its infrastructure have been determined. Directions for using artificial intelligence are proposed.

**Keywords:** digital transformation, digital transformation of the labor market, digital labor market infrastructure

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